

Love and Salaiz: Evaluation of native and adapted plants ...

Title: Evaluation of native and adapted plants for landscape use

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Abstract

This research is intended to be the first step in commercialization of new varieties of native and adapted trees, shrubs, perennials, and ornamental grasses. Establishment and preliminary evaluations of native plant species are reported. Seed collected in 2005 was planted in the greenhouse and established in the field at the Aberdeen R & E Center. Information was recorded on ease of establishment and first year horticultural value. Many species and individuals within species appeared to be exceptional for attractiveness and potential horticultural value. Additional seed collections of native and adapted species were completed in 2006.

Objectives

This project was guided by two major objectives:

- 1) Identification of native and adapted species for use in traditional and water-conserving landscapes through collection and evaluation activities.
- 2) Development and release of new landscaping plants in the form of trees, shrubs, and perennials for use by the Idaho nursery industry.

The eventual and ultimate goal is to develop unique plant materials that will attract new consumers and help make local landscape nurseries more competitive and profitable. This report details the first year of research accomplishments on this project.

Accomplishments

Seed Collection

Throughout the summer and fall of 2005, native plant seed was collected *in situ*, purchased from other collectors, or obtained from other institutional researchers. Preference was given to perennial wildflowers, although seed of some shrubs was also collected. Emphasis was on perennial species that exhibit some drought tolerance. Genera chosen for evaluation included *Lupinus* (lupine), *Sphaeralcea* (globemallow), *Penstemon* (penstemon), *Castilleja* (Indian paintbrush), *Eriogonum* (buckwheat), *Agastache* (hyssop), *Aguilegia* (columbine), *Salvia* (mint), *Chamaebatiaria* (desert fernbush), and *Clematis* (shrubby clematis). Also, a number of native grass species were obtained. Table 1 provides a summary of plant materials accumulated for evaluation.

Collection activities for Idaho native plants were conducted in the Island Park area, the Pioneer Mountains, the southern portion of the Craters of the Moon National Monument, and the foothills southwest of Pocatello. Major seed purchases were made from Seeds Trust (Hailey, ID), Western Native Seed (Coaldale, CO), Flagstaff Native Plant and Seed (Flagstaff, AZ), Plants of the Southwest (Santa Fe, NM), Wind River

Seed (Manderson, WY), Northwest Native Seed (Seattle, WA), Rocky Mountain Rare Plants (Franktown, CO), American Penstemon Society, and the North American Rock Garden Society. With few exceptions purchases were of plants native to the Northwest and/or the Rocky Mountain regions.

Table 1. Summary of 2005 seed collections that were used for 2006 plot establishment.

Genus	Total Accessions	# Species Represented	# <i>In situ</i> Idaho Collections
<i>Lupinus</i> (lupine)	89	18	34
<i>Sphaeralcea</i> (globemallow)	71	8	20
<i>Penstemon</i> (penstemon)	217	85	41
<i>Castilleja</i> (Indian paintbrush)	33	15	12
<i>Eriogonum</i> (buckwheat)	66	26	26
<i>Agastache</i> (hyssop)	13	5	5
<i>Aquilegia</i> (columbine)	5	5	0
<i>Salvia</i> (mint)	7	3	0
<i>Chamaebatiaria</i> (desert fernbush)	2	1	1
<i>Clematis</i> (shrubby clematis)	13	8	0
Mixed Grass Species	45	18	12

Researchers at public institutions are actively working on many native species. The following genera were requested and obtained from other scientists: *Lupinus* from Scott Jenson, BLM, Ogden, UT; *Sphaeralcea* from Michael Peel, ARS, Logan, UT; *Penstemon* and grass species from Loren St. John, NRCS, Aberdeen, ID; *Clematis* from Dale Lindgren, University of Nebraska, North Fork, NE; and *Eriogonum* from Ann DeBolt, USFS, Boise, ID.

Procedures

In November of 2005, seed was mixed with moist potting soil/sand, placed in Ziploc bags, and stratified for approximately three months at 40⁰ F. Exceptions were seed of *Sphaeralcea*, *Lupinus*, and grass species that require no cold treatment for germination. In March, seed was planted in flats and allowed to germinate in a greenhouse at the Aberdeen R&E Center. When Plants were 2-3 weeks old, up to 40 plants from each seed lot were teased out of the flats and planted individually into cone flats. In May, plants were transplanted to the field on the Aberdeen R&E Center. Approximately 1 ½ acres of land were required for establishment of all species in plots.

Plant establishment practices were designed to mimic nursery handling procedures. The intent was to provide selection pressure for plants capable of thriving through typical production and transplanting procedures. Careful notes were maintained on germination and survival during establishment.

Weather had a critical impact on transplant survival. A severe hail storm struck the Aberdeen area a few weeks after grasses were placed in the field, and a few days after

Castilleja, *Sphaeralcea*, *Agastache*, and *Lupinus* species were transplanted. Damage to most species was serious and negatively impacted transplant survival.

During and after establishment, plants were provided with limited inputs. A small amount (40 lbs/acre) of nitrogen fertilizer was applied prior to transplanting. Within the first two weeks after transplanting, a brief irrigation was applied every other day. Subsequently, weekly irrigations were made at levels around 1/3 of ET replacement for bluegrass. This typically equated to an application rate of less than ½ inch per week.

Following establishment, periodic assessments were made of vigor, tendency to flower during the first season, and general horticultural value. Evaluations reflected accession (meaning general notes on the entire plot) characteristics, although notes were maintained identifying exceptional individuals within accessions.

Results

Genera varied in ability to withstand propagation procedures. Lupines emerged well but approximately 60% of the plants did not survive the first stage of propagation, namely the teasing and transplanting process in the greenhouse. Desert fernbush and the buckwheat and Indian paintbrush species succumbed to sporadic dumping-off in the germination flats, but generally withstood the rest of the establishment process. Many penstemon species did not germinate, but those that did were easily handled during transplanting. The remaining species, for the most part, exhibited good transplanting and handling characteristics.

The severe hail injury that occurred in the field had a greater impact on establishment of some species than on others. The grasses sustained minimal visible damage and little or no change in growth rate. The globemallows and hyssops experienced extreme defoliation and stem breakage, but showed little or no mortality and recovered quickly. The lupine and Indian paintbrush species were severely and permanently damaged by the hail. The majority of accessions of both genera sustained 100% mortality.

Genera established and general performance of each are listed in Table 2. Exceptional species and descriptions of their horticultural characteristics are found in Table 3.



Lupinus excubitus

The Lupine species, almost universally, suffered high rates of mortality during transplanting and establishment. Three species, *L. polyphyllus*, *L. nootkatesis*, and *L. excubitus* seemed to survive better than the others. *L. excubitus* produced exceptionally attractive plants with low mounds of silver-fringed leaves, although none flowered during this first year.

The globemallows established easily, grew rapidly, and all flowered profusely during the first year. Most species flowered late into the fall. *S. caespitosa* is a compact dwarf plant with very large flowers. *S. ambigua* displayed unusual light pink to purple colored flowers.



Sphaeralcea caespitosa

Table 2. General establishment and horticultural characteristics of native genera planted to the field at the Aberdeen R & E Center.

Genus	# Accessions Established	Vigor	Establishment Problems
<i>Lupinus</i> (lupine)	20	Poor	Loss resulting from root disturbance, hail damage
<i>Sphaeralcea</i> (globemallow)	60	Good	None
<i>Penstemon</i> (penstemon)	103	Fair to Good	Poor seed germination (mostly with seed older than 3 years)
<i>Castilleja</i> (Indian paintbrush)	10	Poor	Damping off, hail damage
<i>Eriogonum</i> (buckwheat)	47	Poor to fair	Damping off
<i>Agastache</i> (hyssop)	11	Good	None
<i>Aquilegia</i> (columbine)	4	Fair	Some death from transplant shock
<i>Salvia</i> (mint)	6	Good	None
<i>Chamaebatiaria</i> (desert fernbush)	1	Poor	Damping off
<i>Clematis</i> (shrubby clematis)	6	Fair	Sporadic seed germination
Mixed Grass Species	43	Good	None

The penstemon species showed extreme variation in form, habit, and tendency to flower during the first year. Most grew rapidly, remained healthy all season, and showed evidence of flower initiation. However, many started flowering so late in the season that they failed to bloom before frost disrupted growth. Species that flowered profusely the first summer and were exceptionally attractive included *P. ambiguus*, *P. whippleaus*, *P. pinifolius*, *P. strictus*, *P. pratensis*, *P. purpusii*, and *P. rostriflorus*.



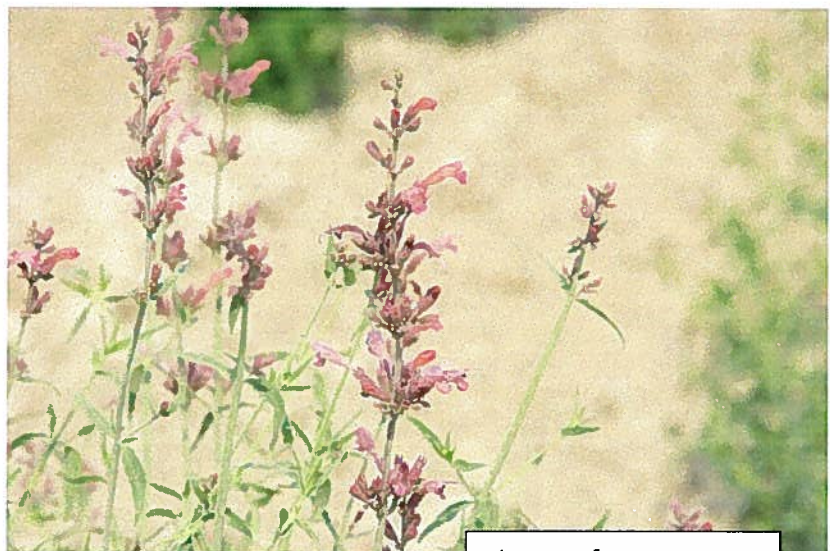
Castilleja integra

Indian paintbrush, by and large, did not survive the hail event that disrupted establishment. Accessions of two species exhibited partial survival and good bloom habit, namely *C. linariifolia* and *C. integra*.

The buckwheats, with few exceptions, established easily and remained healthy in the field. However, they tended to grow slowly and few initiated flowers during the first season. *E. wrightii* was an exception and produced numerous light pink flowers on loosely branched stalks. *E. breedlovei* was a tiny specimen that produced attractive white

flower globes. *E. corymbosum* flowered the first year but showed a loose, rangy growth habit. However, some plants showed hints of the attractive globular form for which it is known.

For the most part, the hyssops were surprisingly attractive and easily handled. *A. rupestris* produced beautiful orange to pink flowers late into the season, holding until hard frost. *A. foeniculum* segregated for white and purple flowers with both types having exceptional beauty. The five species of columbine established were also easy to handle and most produced a few flowers the first year. *A. caerulea* segregated for type and produced many dwarf plants with blue leaves. One other species miscellaneous that showed ornamental potential was a floriferous native yellow poppy, *Papaver roceum*.



Agastache rupestris

Table 3. Native plant species expressing exceptional horticultural value during the 2005 establishment year at the Aberdeen R & E Center.

Species	Description
<i>Lupinus</i> (lupine)	
<i>excubitus</i>	Compact form, silver-edged leaves, no first year bloom
<i>nootkatensis</i>	Compact form, red tinged leaves, no first year bloom
<i>polyphyllus</i>	Tall, good vigor, consistent bloom, red to blue flowers
<i>Sphaeralcea</i> (globemallow)	
<i>munroana</i>	Various forms, long bloom period
<i>caespitosa</i>	Dwarf, prostrate habit, very large blooms
<i>parvifolia</i>	Upright habit, very floriferous, long bloom period
<i>ambigua</i>	Floriferous, unusual pink to purple flower color
<i>Penstemon</i> (penstemon)	
<i>ambiguous</i>	Tall plants, small leaves, many flattened pink flowers
<i>whippleanus</i>	Consistent bloom, beautiful purple flowers
<i>pinifolius</i>	Woody, needle-like leaves, some 1 st year red blooms
<i>strictus</i>	Vigorous, sporadic 1 st year bloom, large blue flowers
<i>pratensis</i>	Smaller plant, consistent bloom, light lavender flowers
<i>purpusii</i>	Prostrate plant, very floriferous, dark purple flowers
<i>rostriflorus</i>	Moderately tall, consistent production of scarlet flowers
<i>Castilleja</i> (Indian paintbrush)	
<i>linariifolia</i>	Higher survival rate, fair vigor, bright red bloom
<i>integra</i>	Attractive leaves and red flowers, late bloom
<i>Eriogonum</i> (buckwheat)	
<i>breedlovei</i>	Very small leaf mat, 1 st year bloom, white flowers
<i>corymbosum</i>	Mounding habit, 1 st year bloom, pinkish flowers
<i>niveum</i>	Silver leaves, sporadic 1 st year bloom
<i>wrightii</i>	Compact leaf mat, floriferous, white to pink flowers
<i>Agastache</i> (hyssop)	
<i>rupestris</i>	Medium height, long spikes, orange to pink flowers
<i>foeniculum</i>	Tall, long bloom period, mixed white/purple flowers
<i>Aquilegia</i> (columbine)	
<i>caerulea</i>	Some with dwarf blue foliage, white/blue flowers
<i>Salvia</i> (mint)	
<i>dorii</i>	Woody shrub, some 1 st year bloom, strong mint odor
<i>Papaver</i>	
<i>roceum</i>	Floriferous yellow poppy, long bloom period
<i>Clematis</i> (shrubby clematis)	
<i>integrifolia</i>	Mounding, some first year bloom, blue/pink flowers
Mixed Grass Species	
<i>Poa ampla</i>	Medium height, graceful long-lasting spikes
<i>Festuca idahoensis</i>	Small, many forms, blue to dark green leaves, attractive
<i>Agropyron cristatum</i>	Short, attractive foliage, exceptionally large seed heads
<i>Sporobolus cryptanthus</i>	Medium height, plummy spikes, reddish fall color

The shrub species were moderately easily to establish, although some damping-off and transplant losses occurred. Some accessions of both purple sage and shrubby clematis produced first year blooms. The desert fernbush was very slow to produce new growth in the field and plants were only a few inches tall at the end of the summer, although they looked relatively healthy.

The grass species were universally easy to establish. Many showed good ornamental potential, the best being big bluegrass (*Poa ampla*), crested wheatgrass (*Agropyron cristatum*), several accessions of fescue (*Festuca idahoensis* and *Festuca ovina*), and the sacatons (*Sporobolus* spp.).

Assessment of value and attractiveness expressed after the first year may change in subsequent years. Some of the plants with slow establishment characteristics have yet to demonstrate value. Essential to declaration of value will be hardiness and longevity, traits that will require 2-5 years to assess. However, it is clear that many of the native plants established in field plots during the summer of 2005 are strong candidates for future commercialization.

Expenditure Report

<u>Category</u>	<u>Amount Allocated</u>	<u>Amount Expended</u>
Salaries, wages and fringe benefits	\$8,120	\$8,120
Travel for collection activities	\$1,200	\$1,140
Pots, trays, labels, soil mix, etc	\$1,050	\$1,180
Field charges, local motor pool, seed	\$1,450	\$ 960
Total funds allocated	\$11,820	
Total expensed to date		\$11,400
Amount remaining as of 29 Nov 06	\$ 420	
(Most of the remaining funds will be used to purchase additional seed from collectors, to be planted during the spring of 2007.)		